Translated from the German

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WELDING AUTOMATIC MACHINE

The invention pertains to an automated welding machine, having a horizontal beam, to which two or more welding guns (pistols) or tongs [*Translator's note: Also known as pinch welder guns; pincer (plier) spot-welding heads; pistol-like welding torches; trigger-type welding electrode-holders] which are movable, and having a multiple number of

degrees of freedom - are arranged in such a way that can be moved in the longitudinal direction of the beam.

A welding automated machine of this kind is know from the Austrian patent specification AT-AS 363 298.

In the case of industrial robots fro the embodiment of automated welding machines, there often arises the problem to guarantee a great positioning accuracy of the welding guns or tongs while retaining the greatest possible motion clearance-space (range/coverage). At an adequate positioning accuracy, the articulated arm robots (joined-arm robots) - known in the abstract - possess an allowable motion range whereby - due to economic feasibility considerations and floor-space requirements - it is not however advantageous to attach each articulated arm robot in such a way that it is displaceable by itself.

Taking as point of departure the aforementioned setting of the objective, the task to refine the known automated welding machines forms the basis of the invention.

In accordance with the invention, the automated welding machine of the genus mentioned at the outset, is characterized in that the welding guns or tongs are supported by articulated arm robots, which are guided on beams, in the longitudinal direction of the latter.

Thanks to the measure in accordance with the invention, the scope of the application possibilities and the motion clearance-space of the articulated arm robots is considerably expanded to the maximal possible extent.

Additional particularities and features of the invention ensue from the subclaims and the description - which follows - of the diagrammatically represented exemplified embodiments.

On an essentially horizontal beam 1, two articulated arm robots 2 are movably attached in the direction of the double arrow 3, i.. In the longitudinal direction of the beam.

The articulated arm robots 2 by themselves can possess a structural design, known in the abstract. In the shown exemplified embodiment of the automated welding machine, there are provided articulated arm robots 2, having five axles. The possibilities of motion of the of the articulated arm robots are illustrated by means of the arrows 4, 5, 6, 7 and 8.

In order to further expand the possibilities of motion , the beam 1 is guided at one or both of its ends on columns 9 in the direction of the double arrow 10, i.e. is guided in such a way that it can move back and forth. Moreover, the columns 9 can be moved to and fro for the purpose of a horizontal movement of the beam 1 in the direction, which is indicated by the arrow 11 and passes perpendicularly to the

plane of projection (image plane).

The articulated arm robots can be displaced independently from one another on the beam, or can be moved by equal path-intervals in the opposite or the same directions, in order for welding seams to be produced on the beam 1, which are passing parallelly to one another, or are symmetrical. In the case of this embodiment form, it suffices to once relevantly program the control unit for the motions of the automated welding machine, and, then, to simultaneously control both articulated arm robots 2 or - in the case of a multiple number of articulated arm robots - more than 2 articulated arm robots, or also all articulated arm robots. This embodiment form is selected when, e.g., we will concurrently produce weld seams of the same kind on various workpieces.

When weld seams are produced, which are enclosed in themselves, and which, e.g., are symmetrical, it is advantageous when the welding guns 12 - taking as point of departure the same initial point - welds *[sic]* the seam in opposite directions so that the welding starts in a common dipping bath of molten metal, and ends in a common bath. To this end - for spatial reasons - it is advantageous when the axes of rotation 13 of the articulated arm robots 2 are not passing parallelly to one another, but conclude a sharp angle with one another. In doing so there are various possibilities. For example, both axes (or in the case of a multiple number of

articulated arm robots - all axes 13) can be located in the same, preferably vertically or horizontally passing plane, in which, e.g., the longitudinal axis of the beam 1 can also be situated. In doing so, at least one of the axes 13 can conclude a sharp angle with the longitudinal axis of the beam 1. Another possibility consists in that the axis 13 of an articulated arm robot 2 is vertically aligned whereas the axis of the other articulated arm robot 2 passes horizontally.

Otherwise, the axes of rotation 13 of the articulated arm robots 2 can pass in any direction, thus, e.g., perpendicularly or horizontally.

Patent Claims

1. Automated welding machine, having a horizontal beam, on which two or more welding guns (pistols) or tongs - which have a multiple number of degrees of freedom - are movably attached in the longitudinal direction of the beam, characterized in that the welding guns or tongs (12) are attached on the beam (1) by means of articulated arm robots (2), known in the abstract, which are movably guided on the beam (1) in its longitudinal direction.

2. Automated welding machine, as claimed in claim 1, characterized in that

the articulated arm robots (2) are movably guided on the beam (1), independently from one another.

3. Automated welding machine, as claimed in claim 1, characterized in that the articulated arm robots (2) are movably guided on the beam (1) by equal path segments [increments] in the opposite or the same directions.

4. Automated welding machine, as claimed in one of the claims 1 thru 3, characterized in that at least one articulated arm robot (2) can be rotated about an axis 13, which concludes a sharp angle with the longitudinal axis of the beam (1).

5. Automated welding machine, as claimed in claim 4, characterized in that the axes of rotation (13) of the articulated arm robots (2) are parallel to one another.

6. Automated welding machine, as claimed in claim 4, characterized in that the articulated arm robots (2) of the articulated arm robots (2) conclude an angle, e.g., of 90º, with one another, and, in doing so, at least one of the axes (13) is located in a plane, perpendicular to the longitudinal axis of the beam (1).

7. Automated welding machine, as claimed in one of the claims 1 thru 6, characterized in that the beam (1) is movably guided back and forth (see arrow 10) on one end or on both of its ends, on one, respectively two, perpendicularly standing columns (9).

8. Automated welding machine, as claimed in one of the claims 1 thru 7, characterized in that the beam (1) is horizontally movable (see arrow 11).

9. Device as claimed in claims 7 and 8, characterized in that the beam (1) can be moved horizontally as a result of the displacement of the column, respectively columns (9), which are supporting it.

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